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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,101	12/20/2001	Richard L. Woodin	XDEV1140	8517

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EXAMINER

DIAZ, JOSE R

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.		Applicant(s)	
	10/029,101		WOODIN ET AL.	
	Examiner		Art Unit	
	José R Díaz		2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 7, 12, 19, 22, and 28 are still rejected under 35 U.S.C. 102(b) as being anticipated by Ogino et al. (US Pat. No. 5,502,003).

Regarding claims 7, 12, 19, 22 and 28, Ogino et al. teaches a process for forming an electrical connection comprising the steps of: forming a first metal-containing layer (Ni/W) over a silicon carbide (SiC) (see Fig. 7), and annealing the first metal-containing layer (Ni/W) and the silicon carbide (SiC) a temperature less than the melting point of the metal-containing layer or more than 300 °C for at least 10 hours (see col. 3, lines 46-53).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7-8, 10-12, 14-16, 19, 20-22, 24-26 and 28 are still rejected under 35 U.S.C. 103(a) as being unpatentable over Sano (JP 59-214224 A).

Regarding claims 7, 19 and 28, Sano teaches a process for forming an electrical connection comprising the steps of: forming a first metal-containing layer (aluminum/Si) over a silicon carbide (SiC) (see Constitution), and annealing the first metal-containing layer (aluminum/Si) and the silicon carbide (SiC) a temperature less than the melting point of the metal-containing layer (please consider the fact that the melting point of Si is higher than 950 °C) or more than 300 °C (see Constitution). With regards to the claimed limitation of annealing for at least 10 hours, Sano provides a general teaching of annealing for a period longer than 5 min (see last three lines of Constitution). Therefore, it would have been obvious to one of ordinary skill in the art to vary the time period of the annealing process, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Huang*, 40 USPQ2d 1685,1688(Fed. Cir. 1996) citing *In re Aller*, 105 USPQ 233., 235 (CCPA 1955).

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Regarding claim 8, Sano teaches that the metal-containing layer comprises aluminum.

Regarding claims 10-11 and 20-21, Sano teaches that the composition of the metal containing layer is approximately 90% aluminum or substantially pure aluminum (see first sentence or line 5 of Constitution).

Regarding claims 12 and 22, Sano is silent with respect to the claimed time range. However, Sano provides a general teaching of annealing for a period longer than 5 min (see last three lines of Constitution). Therefore, it would have been obvious to one of ordinary skill in the art to vary the time period of the annealing process, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Huang*, 40 USPQ2d 1685,1688(Fed. Cir. 1996) citing *In re Aller*, 105 USPQ 233., 235 (CCPA 1955).

Regarding claims 14 and 24, Sano teaches forming an alloy with the SiC and the metal containing layer (see third sentence in Constitution)

Regarding claims 15 and 25, Sano teaches that the exposed region is a p-type doped (see first three lines of Constitution).

Regarding claims 16 and 26, Sano teaches that the annealing is performed in a vacuum (see second sentence of Constitution).

Claims 7, 9, 12-13, 15, 17-19, 22-23, 25, and 27-28 are still rejected under 35 U.S.C. 103(a) as being unpatentable over Bartsch et al. (US Pat. No. 6,468,890 B2).

Regarding claims 7, 19 and 28, Bartsch et al. teaches a process for forming an electrical connection comprising the steps of: forming a first metal-containing layer (110) over a silicon carbide (100) (see Fig. 1), and annealing the first metal-containing layer (110) and the silicon carbide (100) a temperature less than the melting point of the metal-containing layer or more than 300 °C (see col. 5, lines 55-57 and col. 6, lines 49-67). With regards to the claimed limitation of annealing for at least 10 hours, Bartsch et al. provides a general teaching of annealing for several hours (see col. 6, lines 57-58). Therefore, it would have been obvious to one of ordinary skill in the art to vary the time period of the annealing process, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Huang*, 40 USPQ2d 1685,1688(Fed. Cir. 1996) citing *In re Aller*, 105 USPQ 233., 235 (CCPA 1955).

Regarding claims 9, 12-13 and 22-23, Bartsch et al. is silent with respect to the claimed temperature and time ranges. However, Bartsch et al. provides a general teaching of annealing at lower temperature for several hours (see col. 6, lines 49-59). Therefore, it would have been obvious to one of ordinary skill in the art to vary the time period and the temperature of the annealing process, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Huang*, 40 USPQ2d 1685,1688(Fed. Cir. 1996) citing *In re Aller*, 105 USPQ 233., 235 (CCPA 1955).

Regarding claims 15 and 25, Bartsch et al. teaches that the exposed region is p-type doped (see col. 7, lines 49-52).

Regarding claims 17 and 27, Bartsch et al. teaches that the annealing is performed using a noble gas (see col.7, lines 5-8).

Regarding claim 18, Bartsch et al. teaches the further steps of removing a portion of the first metal containing layer (110) and forming a second metal (130) over the contact region (1400 (see Fig. 1).

Response to Arguments

Applicant's arguments filed December 12, 2003 have been fully considered but they are not persuasive.

With regards to Ogino et al., the reference does teach the claimed limitations. For example, Ogino et al. teaches an ohmic contact formed on a SiC substrate (figs. 1 and 9) by annealing a Ni/W or Ni/W-Si contact layer at a temperature of at least 800 °C (see col. 4, lines 5-7), which is less than the melting point of W (3410 °C), Si (1410 °C) or Ni (1453 °C), for a long period of time (i.e. 48 hours) (see Table 1 and col. 3, lines 49-51).

With regards to the arguments about the "metal-containing layer" (page 8, lines 13-21, page 11, lines 11-12, and page 13, lines 8-16 of Applicant's remarks), nowhere in the claims the term "metal-containing layer" is limited to only a single metal layer. As a matter of fact, the term does not exclude the formation of additional materials or layers as the "metal-containing layer". As such, Applicant is arguing the impermissible importation of limitations or definitions into the claim.

With regards to Sano, it is noted that nowhere in claims 7 and 19 the range of temperature is limited to be less than 660 °C, as now argued by Applicant (page 11,

lines 15-17). As a matter of fact, the only requirements for the temperature, as recited in such claims, are: to be less than the melting point of “a material within the metal-containing layer” [emphasis added] (claim 7, lines 8-9) or to be at least about 300 °C (claim 19, lines 6-7). Sano clearly teaches the limitations by disclosing a temperature of at least 900 °C, which is less than the melting point of Si (1410 °C), (please note that Si is one of the materials used to form the Al-Si “metal-containing layer”, abstract) and which lies inside the claimed range of at least 300 °C.

With regards to Bartsch et al., it is noted that Bartsch et al. discloses that the heating process can be performed by “several hours” (col. 6, lines 56-58). The Merriam-Webster’s Collegiate Dictionary 10th ed. defines the term “several” as “an indefinite number more than two” [emphasis added]. Thus, the claimed range of “in excess of 10 hours” lies inside the range disclosed by Bartsch et al. The court has been held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990). Therefore, the *prima facie* case of obviousness has been established. As such, the rejections are considered to be proper.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Correspondence


Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (571) 272-1727. The examiner can normally be reached on 9:00-5:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JRD
3/20/04


GEORGE ECKERT
PRIMARY EXAMINER